

## CLAIMS

1. A plastisol formulation, comprising:

a) a plasticizer or mixture of plasticizers; and

5 b) a mixture of polymer particles comprising at least two components A and B;

c) at least one member selected from the group consisting of fillers, coupling agents, stabilizers, desiccants, rheological additives, hollow bodies and mixtures thereof;

wherein said polymer particles comprising at least two components A and B have one of the following structures

10 ba) a 2-stage structure, a 3-stage structure or multi-stage structure, or

bb) a gradient polymer structure.

2. The plastisol formulation according to claim 1, wherein said component A comprises a polymer particle obtained by emulsion polymerization, said polymer particle having a core KA, an outermost shell S<sub>1</sub>A, a second shell S<sub>2</sub>A and a third shell S<sub>3</sub>A;

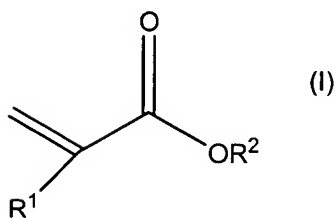
15 wherein said component B comprises a polymer particle comprising a core KB, an outermost shell S<sub>1</sub>B, a second shell S<sub>2</sub>B and a third shell S<sub>3</sub>B;

wherein said core KA comprises the following monomers in copolymerized form:

K A a) 10 to 50 percent by mass, relative to the core, of (meth)acrylates of

Formula I

20



wherein

$R^1 = \text{H or CH}_3$ ; and

$R^2 = \text{CH}_3 \text{ or CH}_2\text{CH}_3$ ;

K A b) 50 to 90 percent by mass, relative to the core, of compounds of Formula I;

wherein  $R^1 = \text{H or CH}_3$ , and  $R^2$  is selected from the group consisting of propyl,

5 isopropyl, tert-butyl, n-butyl, isobutyl, pentyl, hexyl, iso-octyl, octyl, cyclohexyl, 2-ethylhexyl, octadecyl, dodecyl, tetradecyl, oleyl, decyl, benzyl, cetyl, isobornyl, neopentyl, cyclopentyl, undecyl, and docosyl;

K A c) 0 to 10 percent by mass, relative to the core, of compounds that can be copolymerized with the monomers KA a) and/or KA b); and

10 K A d) 0.1 to 9.9 percent by mass of monomers containing an epoxy group;

wherein said outermost shell  $S_1$  A comprises the following monomers in copolymerized form:

$S_1$  A a) 70 to 100 percent by mass of monomers of Formula I,

wherein

15  $R^1 = \text{H or CH}_3$ , and

$R^2 = \text{CH}_3 \text{ or CH}_2\text{CH}_3$ ;

$S_1$  A b) 0 to 30 percent by mass of the monomer of Formula I, wherein

the  $R^1$  and  $R^2$  have the meaning indicated for K A b); and

$S_1$  A c) 0 to 10 percent by mass of a monomer copolymerized with  $S_1$  A a) and  $S_1$  A

20 b);

wherein said second shell  $S_2$  A comprises of the following monomers in copolymerized form:

$S_2$  A a) 20 to 80 percent by mass of monomers of Formula I, wherein

$R^1 = \text{H or CH}_3$ , and

25  $R^2 = \text{CH}_3 \text{ or CH}_2\text{CH}_3$ ;

S<sub>2</sub> A b) 20 to 70 percent by mass of the monomer of Formula I, wherein

R<sup>1</sup> = H or CH<sub>3</sub>, and

R<sup>2</sup> has the same meanings as for K A b); and

S<sub>2</sub> A c) 0.1 to 9.9 percent by mass of monomers containing an epoxy group;

5 wherein said third shell S<sub>3</sub> A comprises the following monomers in copolymerized form:

S<sub>3</sub> A a) 30 to 100 percent by mass of monomers of Formula I, wherein:

R<sup>1</sup> = H or CH<sub>3</sub>, and

R<sup>2</sup> = CH<sub>3</sub> or CH<sub>2</sub>CH<sub>3</sub>;

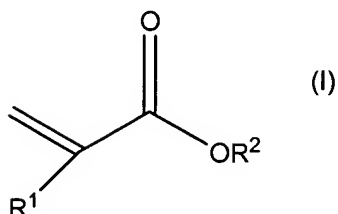
10 S<sub>3</sub> A b) 0 to 70 percent by mass of the monomer of Formula I, wherein:

R<sup>1</sup> = H or CH<sub>3</sub>, and R<sup>2</sup> has the same meanings as for K A b); and

S<sub>3</sub> A c) 0 to 10 percent by mass of a monomer that can be copolymerized with S<sub>1</sub>A) to S<sub>1</sub>A), the monomers having the meanings indicated for K A c);

wherein said core KB comprises the following monomers in copolymerized form:

15 K B a) 10 to 50 percent by mass, relative to the core, of (meth)acrylates Formula I



wherein

20 R<sup>1</sup> = H or CH<sub>3</sub>; and

R<sup>2</sup> = CH<sub>3</sub> or CH<sub>2</sub>CH<sub>3</sub>;

K B b) 50 to 90 percent by mass, relative to the core, of compounds of Formula I, wherein R<sup>1</sup> and R<sup>2</sup> have the meanings indicated for K A b);

K B c) 0 to 10 percent by mass, relative to the core, of compounds copolymerizable with the monomers KB a) and/or KB b); and

K B d) 0.1 to 9.9 percent by mass of monomers that contain nucleophilic groups,

S<sub>1</sub> B a) 70 to 100 percent by mass of monomers of Formula I, wherein:

5 R<sup>1</sup> = H or CH<sub>3</sub>, and

R<sup>2</sup> = CH<sub>3</sub> or CH<sub>2</sub>CH<sub>3</sub>;

S<sub>1</sub> B b) 0 to 30 percent by mass of the monomer of Formula I, wherein:

R<sup>1</sup> and R<sup>2</sup> have the meaning indicated for K A b);

S<sub>1</sub> B c) 0 to 10 percent by mass of a monomer copolymerizable with S<sub>1</sub> B a) and/or

10 S<sub>1</sub> B b); and

S<sub>1</sub> B d) 0.1 to 9.9 percent by mass of monomers that contain nucleophilic groups;

wherein said second shell S<sub>2</sub> B of polymer B comprises the following monomers in copolymerized form:

S<sub>2</sub> B a) 20 to 80 percent by mass of monomers of Formula I, wherein:

15 R<sup>1</sup> = H or CH<sub>3</sub>, and

R<sup>2</sup> = CH<sub>3</sub> or CH<sub>2</sub>CH<sub>3</sub>;

S<sub>2</sub> B b) 20 to 70 percent by mass of the monomer of Formula I, wherein:

R<sup>1</sup> = H or CH<sub>3</sub>, and R<sup>2</sup> has the same meanings as for K B b); and

S<sub>2</sub> B c) 0.1 to 9.9 percent by mass of monomers that are capable of a nucleophilic

20 reaction with the epoxide-containing monomer of polymer A;

wherein said third shell S<sub>3</sub>B comprises of the following monomers in copolymerized form:

S<sub>3</sub> B a) 30 to 90 percent by mass of monomers of Formula I, wherein:

R<sup>1</sup> = H or CH<sub>3</sub>, and

25 R<sup>2</sup> = CH<sub>3</sub> or CH<sub>2</sub>CH<sub>3</sub>;

S<sub>3</sub> B b) 10 to 70 percent by mass of the monomer of Formula I, wherein:

R<sup>1</sup> =H or CH<sub>3</sub>, and R<sup>2</sup> has the same meanings as for K B b);

S<sub>3</sub> B c) 0 to 10 percent by mass of a monomer copolymerizable with S<sub>1</sub>B a) and/or S<sub>1</sub>B b), the monomers having the meanings indicated for K A c); and

5 S<sub>3</sub> B d) 0.1 to 9.9 percent by mass of monomers that contain nucleophilic groups.

3. The plastisol formulation according to claim 1, wherein a mixing ratio of components A and B ranges between 100:0 and 20:80 parts by weight.

4. The plastisol formulation according to claim 1, wherein a mixing ratios relative to the total mass of the component A have the following values:

10 (K A) 20 to 90 percent by mass,

(S<sub>1</sub>A) 10 to 80 percent by mass,

(S<sub>2</sub>A) 0 to 70 percent by mass, and

(S<sub>3</sub>A) 0 to 70 percent by mass.

15 5. The plastisol formulation according to claim 1, wherein a mixing ratio relative to the total mass of the component B has the following values:

(K B) 20 to 100 percent by mass,

(S<sub>1</sub>B) 0 to 80 percent by mass,

(S<sub>2</sub>B) 0 to 70 percent by mass, and

(S<sub>3</sub>B) 0 to 70 percent by mass.

20 6. The plastisol formulation according to claim 1, wherein said component A represents a gradient polymer, wherein the proportions by mass relative to the polymer A are as follows:

(K A) 0 to 90 percent by mass, and

(S A) 10 to 100 percent by mass.

25 7. The plastisol formulation according to claim 1, wherein said component B

represents a gradient type, wherein the proportions by mass relative to the polymer B are as follows:

(K B) 0 to 90 percent by mass,

(S B) 10 to 100 percent by mass.

- 5 8. A method for coating of a metal sheet, comprising:
- contacting a metal sheet with the plastisol according to claim 1.
9. A metal sheet coated with a plastisol formulation according to claim 1.
10. A vehicle, at least partly coated with a plastisol formulation according to claim 1.
11. A method for underbody protection of vehicles, comprising:
- 10 contacting a underbody of a vehicle with the plastisol formulation according to claim 1.